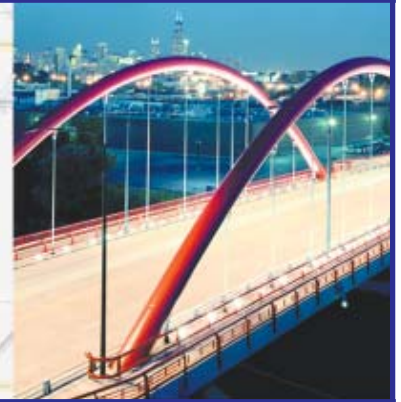




# Illinois Interchange



Illinois Technology Transfer Center

Vol. 12 No. 4 Fall/Winter 2004

## Remote Flagger Stations

The Illinois Department of Transportation, with the help of a federal grant, purchased 20 of the J4 Mechanical Flaggers. These units are currently being tested statewide on a trial basis. The machines use a 25 foot remote cable which allows the operator to be well off the roadway. The stop and slow paddle has red strobe lights on the stop side and amber strobe lights on the slow side. Along with the minimum 7 foot height, the strobe lights should increase its visibility.



Concern about how vehicle operators will respond to the machine is one of the main issues. Since the operator is off the roadway, will people still respect and obey the machine as they would a human operator? Other than some glitches in training or lack of information in some cases, submitted reviews have been favorable.

Let's hope that this is a major step in protecting the lives of our dedicated road workers.

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Please pass this on to other interested parties in your office.

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Illinois Department of Transportation  
Bureau of Local Roads and Streets



Federal Highway  
Administration

# Roy's Corner

by Roy Williamson, Training Development Technician, Illinois Technology Transfer Center

The Technology Transfer Center has begun another training season. Last year was one of T<sup>2</sup> Center's busiest training seasons with over 5,000 people attending 30 different course topics. This year's enrollment is expected to be similar. Currently, space is available in most of our training classes; however, enrollment should gain momentum as we approach the winter months. To ensure your employees receive training, send your enrollment forms soon.

## Flagger Training

I have already completed several Flagger Training classes. The same topic, speeding through work zones, continues to be the biggest complaint by students. This seems to be a hot topic regardless of where I am traveling around the state. New legislation that allows photo speed enforcement in work zones was signed by the Governor. The Illinois Department of

Transportation (IDOT) will evaluate this technology during the next construction season. Even though stiff fines may be issued to speeders, the intent of the legislation is to slow drivers down to the posted speed limit. I believe that if properly enforced the job of flaggers and maintenance workers will be much safer.

I would like to welcome Mark Devries of McHenry County Highway Department to our small group of Flagger Training instructors. Mark will be assisting with Flagger Training classes in the Northeast area of the state. Currently, Regina Jones, IDOT District 9 Bureau of Local Roads, and myself have been teaching all of the Flagger Training classes. Mark will allow the T<sup>2</sup> Center to reach more local agency personnel.

## New Classes

I hope you noticed that the T<sup>2</sup> Center has added some new classes in our training program this year. Backhoe Safety has been scheduled this year however, the number of participants is limited. Please understand that the instructors are employees of major companies; therefore, they can only donate so much time to our cause. Another new class this year is Seal Coats. This class will

discuss pros and cons of different processes and materials. Also, the National Highway Institute (NHI) will offer a HEC-RAS class. This class has been requested by the local agencies for several years; however, IDOT did not have an available instructor. Since this is a NHI course, participants will need to pay a fee. Snow and Ice Control is another popular class. Next year, the T<sup>2</sup> Center hopes to offer an advanced version focusing on pre-wetting and anti icing applications.

## Assistance From You

Budget and travel restrictions may have some impact on training this year. We still plan to provide as much training as possible; however, we are always looking for ways to save money. Your agency could help by allowing the T<sup>2</sup> Center to use your facilities. Most classes require seating for 40-50 students. If you would like to host a class please, contact me. Also, new instructors are often needed. Do you have personnel that would be able to act as a T<sup>2</sup> Center instructor? Could your agency help us train other local agencies? Please feel free to contact me with any suggestions or concerns you have.

What would you like us to offer as far as training is concerned? Are you a specialist in a certain field that we could add to our list?

The T<sup>2</sup> Center wants to provide local agencies with the best, most current training available. BE SAFE and Happy Holidays.



# The Value of Training

*This article is reprinted with permission from Steve Muench, Ph.D. PE, University of Washington. It is a summary of his Ph.D. dissertation written in 2004.*

Knowledge is a vital organizational asset. This is the essential unstated assumption associated with almost all training discussions. While American corporations spend in excess of \$50 billion annually on training (Galvin, 2002) and numerous authors espouse the virtue and necessity of training, few make an effort to actually show its value. This short paper highlights the fundamental premise for continued and even increased support for training: it is an investment in a valuable commodity that produces high returns.

## Knowledge is valuable

Today, in the information age, organizations are routinely valued not on their physical but rather their intellectual capital. Edvinsson and Malone (1997) define intellectual capital as “the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide [an organization] with a competitive edge in the market.” Bassi and Van Buren (1999) point out that “intellectual capital is the only source of competitive advantage within a growing number of industries.” For instance, the \$296 billion market value of Microsoft in June 2004 far exceeds the value of its physical assets. To be sure, much of this value is based on speculation, but much is also based on Microsoft’s intellectual capital—what it knows.

Training is one of the chief methods of maintaining and improving intellectual capital. Because of this, an organization’s training can affect its value. Bassi and Van Buren (1999) found training as a percentage of payroll to be significantly correlated with the market-to-book value of publicly traded companies. Where the average U.S. employer spent about 0.9% of payroll on education and training (Bassi, et al., 1996), training magazine’s top 100 companies [in terms of training] averaged 4% with Pfizer ranking first at 14%.

## Training is an investment

General accounting standards classify training as an expense. However, training is really an investment: an organization typically invests up-front to train its employees (in the form of enrollment fees, travel expenses and opportunity cost of the employee’s time) and, in return, expects future returns (in the form of increased knowledge, skills and productivity). As with any other investment, if the returns outweigh the investment, training is a worthwhile endeavor.

Training is also an investment from the employee’s perspective.



Training increases skills and knowledge, which can lead to better pay or promotion. So who benefits most from the training investment: the employee with increased wages and/or promotion, or the employer with increased productivity? Loewenstein and Spletzer (1998) researched this question and concluded, “the effect of an hour of training on productivity growth is about five times as large as the effect on wage growth.” Therefore, employers “reap almost all the returns to company training” (Bartel, 2000). This may be oversimplifying because employees generally view training as either a gift from the employer or at least a sign of commitment on the part of the employer, which is important to job satisfaction (Barrett and O’Connell, 2001).

In sum, both the employee and employer benefit from the training investment. The question now shifts to one of measurement: do the returns on

*(continued on page 13)*



# Working With Positive Protection

## What is Positive Protection?

A means of physically separating the work space from traffic. Most common examples are portable temporary concrete barriers (TCB), and protective vehicles for moving operations.



## What is the Purpose of Temporary Concrete Barrier?

Temporary concrete barrier provides a safer work area for stationary work operations by containing and redirecting most vehicles (not tractor semi-trailers) away from the work area. This also provides improved safety for motorists.

## What is the Purpose of a Protective or "Shadow" Vehicle?

A protective vehicle provides a safer work area for moving operations. This usually consists of a vehicle with appropriate lights, an arrow board, and a truck mounted attenuator (TMA). The TMA is a collapsible device, mounted at the back of the shadow vehicle. It can absorb a part of the impact when an errant vehicle crashes into it. This also provides a more forgiving environment for errant vehicles.

## How Well Am I Protected with Portable Temporary Concrete Barrier?

Temporary concrete barrier will prevent many vehicles from traveling into the work zone. However, depending on speeds, approach angles, size and weight of vehicles, and house-keeping at the work area, several limitations must be considered.

- Wide loads may overhang past the barrier into the work area.
- Tall loads may roll over or lean over on impact.
- No portable concrete barrier in use in Illinois is designed to stop a tractor semitrailer truck.
- When hit by a vehicle, the TCB may move. If the impact is from the side, the TCB may move into the work area. The higher the speed, angle, and weight of the vehicle, the greater this movement may be.
- On a divided highway with an open median, vehicles traveling in the opposite direction may still cross over the median and enter your work area.
- Vehicles may kick up road debris, or vehicle loads may come loose and enter the work area.
- Materials stored on, leaning against, or near TCB may become projectiles into the work area upon impact.

## To Work Properly, the TCB Must Be Installed Correctly and According to Contract.

- Ends of TCB's must always be anchored.
- TCB's within 3'-6' of a hazard

must be anchored.

- The crash cushion at the traffic end(s) of the TCB must be properly installed to design specifications.
- The gap between the back of sand barrels and the end of the TCB's must be no more than 2'.
- TCB's must be connected with the steel pins shown in the plans.
- New F-Shape (12'-6' sections) does NOT require Styrofoam pads.
- The older 10' New Jersey sections DO require Styrofoam pads.
- The reflectors on the TCB's help guide traffic and keep you safe.

Proper installation of the TCB is the responsibility of the Contractor. However, because these devices may affect your safety, you should be aware of their correct usage.



## How Well Am I Protected By A Shadow Vehicle?

- Shadow vehicles provide protection to workers from rear-end crashes. They also cushion impacts for motorists.
- Workers on the pavement are still

*(continued on page 10)*

# Proposed Minimum Requirements for Maintaining Traffic Sign Retroreflectivity

by Kelly Morse, Bureau of Materials and Physical Research, Analytical Chemistry Laboratory Supervisor

The following article is a summary of the Federal Register/Vol. 69, No. 146/Friday, July 30, 2004, Proposed Rules, regarding minimum levels of retroreflectivity. The comment period for the rulemaking ended October 28, 2004 and some of the following details may be changed and or modified based on the comments received. The Federal Highway Administration (FHWA) has proposed an amendment to the Manual of Uniform Traffic Control Devices (MUTCD) to add methods of maintaining traffic sign retroreflectivity. The proposed methods would establish means for improving the nighttime visibility of traffic signs to promote safety; enhance traffic operations; and facilitate comfort and convenience for all drivers of all ages and abilities.

The MUTCD already requires that traffic signs be illuminated or retroreflective to enhance nighttime visibility. Most signs in Illinois are manufactured with retroreflective sign sheeting. Retroreflective sign sheeting redirects light from the driver's headlights back to the driver allowing the sign to be visible and legible at night. There are several types of retroreflective sign sheeting available which vary in their degree of retroreflectivity as well as color and durability. Therefore, some types of retroreflective sheeting will make signs appear brighter than others. As

signs age, they lose some of their retroreflectivity and will typically fade and lose gloss. This degradation makes signs less visible over time and diminishes the effectiveness of the sign to communicate regulatory, warning, and guidance messages to the driver. Therefore, to maintain effectiveness the signs must be replaced before they reach the end of their useful retroreflective life.

**Retroreflective sign sheeting redirects light from the driver's headlights back to the driver allowing the sign to be visible and legible at night.**

FHWA research led to the development of minimum retroreflective values for regulatory, warning, and guide signs based upon currently available materials, vehicle characteristics, and capabilities of the driving population. In addition, new methods for assessing and managing the retroreflectivity of existing signs have been developed. The assessment methods entail the evaluation of the

sign's retroreflectivity by nighttime visual inspection or measurement of retroreflectivity using an appropriate instrument. Visual and numeric criteria based upon the minimum retroreflectivity needs of the drivers are used to judge whether the sign has adequate nighttime visibility. Sign management methods involve tracking or predicting the retroreflective life of individual signs and scheduling for the replacement of those signs that are approaching the minimum levels.

A breakdown of the assessment methods are as follows: Visual Nighttime Inspection Method, Calibration Signs Procedure, Consistent Parameters Procedure, Comparison Panels Procedure and the Measured Retroreflectivity Method.

Visual nighttime inspection involves the assessment of the visibility and retroreflectivity of the traffic signs as the inspector approaches the signs. For consistency the FHWA has provided guidelines that should be adhered to when developing and performing nighttime inspections. First, the agency should develop guidelines and procedures for inspectors to use in conducting the inspections. Second, the inspections should be performed at normal roadway operating speeds from the travel lane. Third, the inspection shall be done using low beam headlights. Lastly, the signs shall be inspected at the typical

*(continued on page 11)*

# 2004 APWA IL Chapter Snowfighter's Rodeo

On October 1, 2004, the Illinois Chapter of the American Public Works Association (APWA) held its 17<sup>th</sup> Annual Snowfighter's Rodeo in Galesburg, IL. Snowplow teams from across the state came to compete in three categories: Written Test, Circle of Safety, and Obstacle Course. After the competitions, the City of Urbana's team of Brad Drew and Andy Murphy was awarded the "Traveling Trophy" with 448.5 points and is eligible to participate in the Regional Rodeo in Michigan.

The written test consists of 40 multiple choice and true/false questions on knowledge of safe driving rules and snow & ice removal techniques. Each question was worth 2.5 points for a total of 100 points with bonus questions used as a tie breaker. Sangamon County's team of Gary Butcheck and Chris Kmett won first place with 105 points.

The circle of safety consists of a truck with 20 operational defects. The defects may be found on the plow, hitch, spreader, in the hydraulic system, and on the truck itself. Each team has 3 minutes to detect as many defects as possible. Each defect is worth 5 points for a total of 100 points. The City of Galesburg's team of Steve Erickson and Chad Danielson won first place with 100 points.

The obstacle course consists of the following nine obstacles: parked vehicle, inside curb, offset alley, serpentine, driver exchange, backing, straight line, outside curve, and stopping accuracy. Each obstacle is worth 40 points for a total of 360 points. The object is to complete the course as quickly as possible while maintaining accuracy at each individual obstacle. Each team is timed and points will be deducted for slower times. The City of Urbana's team of John Collins and Doug Logue won first place with 300 points.



City of Champaign



Madison County



City of East Peoria

Best Dress Plow Winner  
Village of Savoy





Judges



Starting Line



Testing



Backing



Serpentine



# APWA Public Works Winners

*The Technology Transfer Center would like to congratulate John M. Heinz from the Village of Barrington and John P. Kos, IDOT District Engineer, for being selected as part of APWA's Top Ten Public Works Leaders of 2004.*

## **John M. Heinz** Director of Public Works Village of Barrington, Illinois



John Heinz has learned that serving a small community like Barrington requires big capabilities. Any

municipality with a population of 10,000 cannot support a multi-divisional operation, so Heinz and his staff of 35 handle water distribution and treatment, wastewater collection and treatment, stormwater management, contractual refuse and recycling, building and grounds maintenance, forestry, streets, fleet services, municipal engineering, and planning and zoning.

A complex planning project Heinz piloted was the Garfield Center Downtown Redevelopment, which required partnering with nine property owners and succeeded in keeping an important business within the small village. The anchor store at Garfield Center, a Jewel-Osco supermarket and pharmacy, wanted to take the old store out of service and open a new, larger one. "Usually a business like that will

move out to a cornfield, where they can sprawl out and provide plenty of parking," said Heinz. "But Jewel has had a tremendous presence in Barrington since establishing headquarters here in the late 1920s."

To expand the small downtown space, the village bought land from nine owners, including a railroad and a resident, and distributed 33 other properties to those owners so they would experience no net loss. The village also supported Jewel with financing options, engineering services, and public works operations. The store was torn down and a new facility opened just eight months later.

One concern facing small and large municipalities alike is increasingly stringent environmental regulations, such as stormwater management. "Stormwater runoff can have as adverse an effect on our creeks and rivers as direct pollution," said Heinz. Barrington has done some pioneering work in stream bank stabilization, including demonstration projects using state-of-the-art bioengineering techniques. The 3-acre Kilgoblin Wetland project has garnered national attention for its success in capturing stormwater discharge to enhance water quality and provide flood control.

Also during his 15-year tenure in Barrington, Heinz has implemented a multiyear capital infrastructure program with an annual maintenance component; construction of a new water tower, water reservoir, and

water filtration system; wastewater treatment plant upgrades; and the STAR Wide Area Fixed Network Automatic Meter Reading program.

## **John P. Kos, P.E.** District Engineer Illinois DOT



John P. Kos has spent most of his 24-year career working on Illinois DOT (IDOT) expressway projects in the busy

Chicago area, developing expertise in large urban highway rehabilitation. He was the project manager for the design of a 3-mile section of the Dan Ryan Expressway in the late 1980s, which was at the time the nation's largest-ever expressway reconstruction project. In the heart of downtown, the project included 2 miles of elevated structure, complex geometrics, and Chicago's heaviest traffic volumes.

At that time the interstates were just coming up for their first round of rehabilitation. There was little experi-

*(continued on page 9)*



**APWA Public Works Winners**

*(Continued from page 8)*

ence with rebuilding major expressways under a traffic load of 300,000 vehicles a day, and many states turned to Chicago's successes as models. Kos's portfolio includes such mega projects as the \$450 million reconstruction of I-90/94 Kennedy Expressway from downtown Chicago to O'Hare Airport; the construction of a new urban expressway, the Elgin O'Hare; and the renovation of I-55 Stevenson Expressway from Lake Shore Drive to I-294 in Chicago.

Such projects pose various challenges for the engineer. "We need to consider travel patterns, job patterns, and growth patterns, all of which are constantly changing in dynamic regions like Chicago," said Kos. "Then there are political factors, environmental issues, funding, and potential impacts on neighboring residences, businesses, and utilities.

Eventually you address the construction aspect, how to build what you're planning to build."

Kos has served in various bureaus and districts of IDOT, gaining experience in the Bureaus of Planning and Design and later heading the Maintenance Bureau and then the Construction and Materials Bureau. In January 1998 he was appointed district engineer of District 1, which includes the state highway system within the six-county Chicago metropolitan area. His most recent projects there include groundwork for two major interstate reconstruction projects currently in the early stages: the \$350 million Kingery Expressway Reconstruction linking Illinois and Indiana and a \$500 million, 8-mile reconstruction on the Dan Ryan Expressway in Chicago.

Kos recently moved to District 3, which covers 11 counties adjacent to the Chicago metropolitan area. His new territory has a number of high-growth pockets with some communi-

ties issuing as many as 2000 new housing permits a year. One of the first projects on the docket is the Prairie Parkway, currently in the early planning stages, which will open a new traffic corridor west of the Chicago metropolitan area.

"If you look at a map, the interstates converge from a semicircle around Chicago into the city, based on the traffic patterns for employment in the early days of expressways," said Kos. "Those patterns are no longer the only ones. Many suburbs have heavy and growing employment. There is a need for new corridors going in different directions."

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2004 Public Works Project of the Year  
Stanford Avenue Project  
Awarded to:  
City of Springfield

**APWA**  
AMERICAN PUBLIC WORKS ASSOCIATION

**Illinois Chapter Conference**  
May 4-6, 2005

**AEMP** 3rd Association of Equipment Management Professionals, Illinois Chapter Expo

 21st PPUATS Street Maintenance Seminar

 3rd Institute of Transportation Engineers, Illinois Section Traffic Engineering Track

 13th International Municipal Signal Association, Midwestern Section Certification Training

## Working With Positive Protection

*(continued from page 4)*

- exposed to traffic from their sides.
- Worker and motorist visibility is sometimes limited due to the shadow vehicle.
- The shadow vehicle will roll forward if rearended. Workers need to maintain the recommended roll-ahead distance between them and the shadow vehicle.
- The proper use of shadow vehicles is the responsibility of the Contractor. However, you should coordinate your actions to help

assure your safety, and remain aware of correct usage.

## What Should I Do To Ensure That The Work Area Is As Safe As Possible?

1. Stay Alert
  - Stay as far from traffic as practical.
  - Keep an eye and an ear to traffic.
  - Wear high visibility vests, hats, etc.
  - Look out for each other.
  - Keep tools, equipment, and materials away from TCB's

and traffic.

2. Take part in your own safety, and report deficient or suspect installations of positive protection.
  - Anchorage of TCB's
  - Location of Devices
  - Condition of Devices
  - Sound Connection of TCB's
3. Check and repair any impact damage promptly.
  - Damaged or displaced devices will have reduced protective capability.

# Work Zone Safety Legislation Emphasized in Illinois

Four safety-related bills passed during Spring Session of the Illinois General Assembly and have been signed into law by Governor Blagojevich. These laws increase the penalty for speeding in work zones and are currently in effect.

## Highlights

**PA 93-705** provides that the fine for failing to follow proper procedures upon entering a construction or maintenance zone is not less than \$100 and not more than \$10,000.

**PA 93-667** authorizes the Secretary of State to suspend or revoke the driving privileges of a person without a preliminary hearing upon a showing that the person has violated a provision of the Vehicle Code concerning driving in construction or maintenance zones.



**PA 93-947** allows the Illinois State Police to establish an automated traffic control system for obtaining a photograph or other recorded image of any vehicle violating the speed limit in a construction or maintenance zone established by the Department of Transportation or the Illinois State Toll Highway Authority.

**PA 93-955** increases the minimum fines for speeding in a work zone from \$150 to \$250 for first offenses. The fine increases for subsequent offenses.

## Traffic Sign Retroreflectivity

(continued from page 5)

viewing distance for the sign, the distance which provides the driver adequate time for an appropriate response. In addition to the above, one or more of the following procedures should be used with the nighttime inspection to ensure that the inspector has a good indication of how signs at the minimum level will appear.

- The calibration signs procedure utilizes a set of signs known to meet or exceed the minimum retroreflectivity requirements. These signs are viewed prior to conducting the nighttime inspection. Calibration signs are needed in each color of sign for which there are minimum levels. The calibration signs are viewed at the typical viewing distances and from the same vehicle that will perform the nighttime inspections. The calibration signs shall be properly stored between inspections and the retroreflectivity checked periodically to verify they meet or exceed minimum values. Signs in the field that are viewed to be less bright than the appropriate calibration sign shall be replaced.
- The consistent parameters procedure requires the inspections to utilize the same factors that were used to develop the minimum levels. Those factors utilized are, a full sized SUV or pickup truck, model year 2000 or newer, inspector age 60 or over, and the signs shall be viewed at the typical viewing distances used for the particular sign being evaluated. If the inspector using these factors

views the sign to be illegible, the sign shall be replaced.

- The comparison panel procedure utilizes a small panel that has been fabricated to meet or exceed the minimum retroreflectivity values of each type of sign to be evaluated. The appropriate panel is then temporarily attached to the sign being inspected. If the comparison panel is viewed to be brighter than the sign, the sign shall be replaced.

The measured retroreflectivity method involves the use of a retroreflectometer to measure the retroreflectivity of the sign in accordance with ASTM E1709 and comparing the measured values directly with the minimum levels for the sign being inspected. If the measurement is lower than the minimums the sign shall be replaced.



A breakdown of the management methods are as follows: Expected Sign Life Method, Blanket Replacement Method and the Control Sign Method. These techniques provide an option to the agencies that does not involve significant individual sign inspection effort.

The expected sign life method requires the replacement of signs

before they reach the end of their expected service life. The expected service life can be determined by, sign sheeting warranties, sign test deck measurements, and the measurement of retroreflectivity of a population of the signs to represent the whole. In order to utilize the expected sign life method, the age of the sign must be known. This can be accomplished by labeling the signs with the dates of fabrication, installation or replacement. An alternative would be a sign management system with an inventory that tracks the age of individual signs.

The blanket replacement method provides for an agency to replace all the signs in an area or corridor, or of a given sign type, at specific intervals. The replacement interval for the area or corridor, or of a given sign type, is based on the expected sign life for the affected signs. All signs within a replacement area or corridor, or of a given sign type are typically replaced even if the sign was recently installed.

The control sign method utilizes a control sample of signs which is used to represent the total population of an agency's signs. The retroreflectivity of the control signs is monitored at appropriate intervals and sign replacement is based upon the performance of the control signs. First, an agency develops a sampling plan that determines the appropriate number of control needed to represent the agency's sign population. Second, the control signs may be actual signs in the field or installed in a maintenance yard to serve specifically as control signs. Third, the retroreflectivity of the control signs should be monitored following one of the assessment methods previously described. Lastly, the field signs represented by the

(continued on page 12)



## Traffic Sign Retroreflectivity

(continued from page 11)

control signs need to be replaced before the retroreflectivity levels of the control signs reach the minimum levels. An inventory with date, sheeting type service life, etc. is essential in ensuring that the control signs represent the total population.

The minimum retroreflectivity values were formulated through years of research and represent several improvements in the area of retroreflectivity. The minimum retroreflectivity levels are summarized in the chart on page 13.

There are signs that are currently excluded from the minimum requirements. The following signs have been excluded at this time due to the lack of research in order to establish appropriate minimum levels. Parking, standing, and stopping signs (R7 and R8 series), walking/hitchhiking/crossing signs (R9 series, R10-1 through R10-4b), adopt-a-highway signs, all signs with blue or brown backgrounds and

bikeways which are not immediately adjacent to a roadway and that are intended for exclusive use by bicyclists and or pedestrians.

The greatest impacts anticipated after field reviews are, the minimum

values for 36 inch yellow warning signs and the contrast ratio of  $\geq 3:1$  (white retroreflectivity  $\div$  red retroreflectivity) for stop signs. The minimum retroreflectivity value,  $75\text{cd/lx/m}^2$ , for the black on yellow signs is higher than can be expected from new, yellow, engineering grade sheeting,  $60\text{cd/lx/m}^2$ . Many local agencies are still using engineering grade sheeting for many of the signs in their jurisdiction.

This policy will have to be modified as part of the compliance with minimum retroreflectivity values. Also, many stop signs that were evaluated failed to meet the 3:1 requirement despite meeting the minimum



Daytime Appearance



Nighttime Appearance

retroreflectivity values.

Because of the anticipated impacts on the State and Local Agencies, a seven year phase in for ground mounted signs and a ten year phase in for overhead signs were proposed. These time frames would be effective from the date of the final rule. These replacement windows were chosen due to their coincidence with the typical replacement windows for the types of sheeting typically used for each application.

The proposed rulemaking has provided guidelines for attaining minimum standards for retroreflectivity but has also maintained flexibility for the agencies to create and select their own methods and techniques. Education and training efforts will be vital for the success of the program. Both IDOT and the FHWA are dedicated to those efforts.

For more information on the proposed wording, see the MUTCD website at <http://mutcd.fhwa.dot.gov/>

(continued on page 13)

**Traffic Sign Retroreflectivity**

*(continued from page 12)*

| MINIMUM MAINTAINED RETROREFLECTIVITY LEVELS  |            |                                |         |         |         |      |
|--|------------|--------------------------------|---------|---------|---------|------|
| Sign Color   | Criteria   | Sheeting Type (ASTM D4956-01a) |         |         |         |      |
|  |            | I                              | II      | III     | VII     | VIII |
| White on Red   | See Note 1 | 35/7                           |         |         |         |      |
| Black on Orange or Yellow  | See Note 2 | *                              | 50      |         |         |      |
|  | See Note 3 | *                              | 75      |         |         |      |
| Black on White   |            | 50                             |         |         |         |      |
| White on Green   | Overhead   | *I/7                           | *II/15  | *III/25 | 250//25 |      |
|  | Shoulder   | *I/7                           | 120//15 |         |         |      |
| <p>Notes</p> <p>Levels in cells represent retroreflectivity // background retroreflectivity (for positive contrast signs). Units are cd/lx/m<sup>2</sup> measured at an observation angle of 0.2° and an entrance angle of -4.0°.</p> <p>1Minimum Contrast Ratio &gt; 3:1 (white retroreflectivity + red retroreflectivity).</p> <p>2For text signs measuring 48 inches or more and all bold symbol signs.</p> <p>3For test signs measuring less than 48 inches and all fine symbol signs.</p> <p>*Sheeting type should not be used.</p> |            |                                |         |         |         |      |

**The Value of Training**

*(continued from page 3)*

training outweigh the investment?

**Training Return on Investment (ROI)**

When calculated using sound methodology, training has been shown to provide significant return on investment: on the order of 5 to 200 percent. The problem is that methods used to quantify training ROI can often be suspect or even outright self-promotion. Furthermore, it is often very difficult to quantify the effects of training. For instance, one effect of training can be increased job satisfaction, which is difficult if not impossible to quantify. Intuitively we know this is important in retaining good employees; however, it will not show up on an ROI calculation.

In 2000, Bartel provided one of

the best objective looks at the value of training to the employer. She looked at 10 large data set surveys and 16 individual case studies in an attempt to determine the employer’s return on investment for employee training. She found the following:

- Methods using large data sets to compare many different organizations estimated training ROI from 7 to 50 percent.
- Individual case studies estimated training ROI from 100 to 5900 percent. Bartel believes the high ROIs in this category are based on faulty methodology. Her in-depth analysis of two well-constructed internal case studies revealed a 100 to 200 percent ROI.

Therefore, even the most conservative estimate puts training’s ROI at 7 percent – an acceptable rate of return

by most standards. Additionally, although it is not appropriate to generalize based on the results of two case studies, it can be said that based on Bartel’s in-depth analysis of two well-constructed internal case studies, training’s ROI can be much higher: approaching 100 to 200 percent.

**Summary**

Training is a valuable commodity that, if viewed as an investment rather than an expense, can produce high returns. While it is true that training costs money and uses valuable employee time and resources, studies tend to show training provides a positive return on investment – sometimes in the neighborhood of several hundred percent. Therefore, although training might seem like a luxury expense in tight financial times, it is, in fact, one of the most sure and sound investments available.

# Winter Survival Guide

## Frost Bite

### What Happens to the Body:

Freezing in deep layers of skin and tissue; pale, waxy-white skin color; skin becomes hard and numb; usually affects the fingers, hands, toes, feet, ears, and nose.

### What Should Be Done: (land temperatures)

- Move the person to a warm dry area. Don't leave the person alone.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in a warm (105°F) water bath and monitor the water temperature to **slowly** warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm. **NOTE:** If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe

tissue damage.

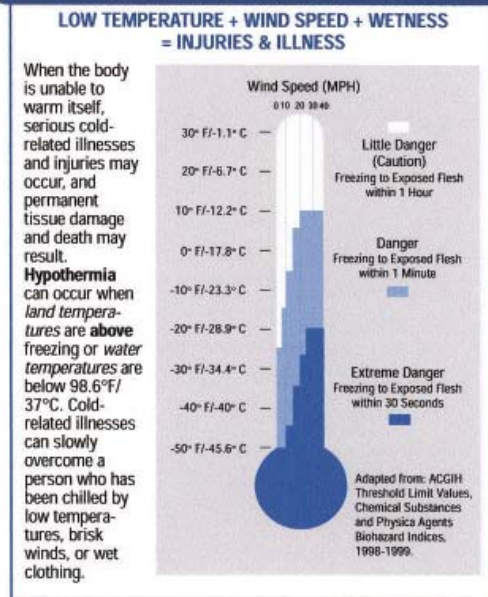
- Seek medical attention as soon as possible.

## Hypothermia

### What Happens to the Body:

Normal Body temperature (98.6° F/37°C ) drops to or below 95°F (350 C); fatigue or drowsiness; uncontrolled shivering; cool bluish

### THE COLD STRESS EQUATION



skin; slurred speech; clumsy movements; irritable, irrational or confused behavior.

### What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace

with warm, dry clothing or wrap the person in blankets.

- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.

### What Should Be Done: (water temperatures)

- Call for emergency help (Ambulance or Call 911). Body heat is lost up to 25 times faster in water.
- **DO NOT** remove any clothing. Button, buckle, zip, and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. **DO NOT** attempt to swim unless a floating object or another person can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending

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## Winter Survival Guide

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knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

## How to Protect Workers

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.

- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.

- Train the workforce about cold-induced illnesses and injuries.

- Select proper clothing for cold,

wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).

- Take frequent short breaks in warm dry shelters to allow the body to warm up.

- Perform work during the warmest part of the day.

- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.

- Use the buddy system (work in pairs).

- Drink warm, sweet beverages (sugar water, sports-type drinks).

Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.

- Eat warm, high-calorie foods

like hot pasta dishes.

## Workers Are at Increased Risk When...

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.

- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).

- They are in poor physical condition, have a poor diet, or are older.

Source: Occupational Safety and Health Administration, OSHA 3156, 1998.

# Winter Driving Skills

**PROBLEM:** The chances of an accident increase with bad weather during the winter months.

**WHAT WE CAN ALL DO:** Here are some tips for winter driving:

- \* Slow down on ice or snow. Braking distances on ice can increase from four to ten times normal. Avoid slamming on the brakes.
- \* In case of a skid, turn the front wheels in the direction of the skid.

- \* If you can see a slick spot ahead, slow down gradually by taking your foot off the accelerator to keep more control of your vehicle.

- \* Keep your windshield washer tank completely full.

- \* When it snows, clean both the front and back windows of your vehicle completely. A peephole is simply not enough and you'll probably be stopped by the police.

- \* Make sure you have proper snow tires or all-weather radials in good condition.

- \* Give yourself extra time to get where you need to go.



The Technology Transfer (T<sup>2</sup>) Program is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to transfer the latest state-of-the-art technology in the areas of roads and bridges by translating the technology into terms understood by local and state highway or transportation personnel.

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### Illinois Technology Transfer Center

### Illinois Department of Transportation

2300 South Dirksen Parkway - Room 205, Springfield, IL 62764

Fax (217) 785-7296

E-mail us at [T2LRSDOT@dot.il.gov](mailto:T2LRSDOT@dot.il.gov)

Program Coordinator:

KEVIN BURKE

E-mail: [burkek@dot.il.gov](mailto:burkek@dot.il.gov)

Phone: (217) 785-5048

Graphics Design Systems Specialist:

AMY NEALE

E-mail: [nealea@dot.il.gov](mailto:nealea@dot.il.gov)

Phone: (217) 782-1682

Training Development Technician:

ROY WILLIAMSON

E-mail: [williamsonrl@dot.il.gov](mailto:williamsonrl@dot.il.gov)

Phone: (217) 785-2350

Visit our website at [www.dot.il.gov/blr/t2center.html](http://www.dot.il.gov/blr/t2center.html)



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## T<sup>2</sup> Advisory Committee

**Craig Fink** (Chairman), County Engineer  
DeWitt County  
RR#2, Box 82P, Clinton, IL 61727  
(217) 935-2438

**Douglas Bishop**, County Engineer  
Perry County  
3698 State Route 13/127, Pinckneyville, IL 62274  
(618) 357-6556

**Eldon Stahl**, Highway Commissioner  
Medina Township (Peoria County)  
R.R.#1, Dunlap, IL 61525  
(309) 579-3101

**Olen Kibler**, Highway Commissioner  
Newman Township (Douglas County)  
608 North Howard, Newman, IL 61942  
(217) 837-2723

**Ed Reeder**, Director of Public Works  
City of Carbondale  
P.O. Box 2047, Carbondale, IL 62901  
(618) 549-5302

**Lynn Krauss**, Director of Public Works  
Village of Oak Lawn  
9446 S. Raymond Ave., Oak Lawn, IL 60453  
(708) 499-7816

ADDRESS SERVICE REQUESTED

Illinois Department of Transportation  
2300 South Dirksen Parkway  
Springfield, Illinois 62764



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